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## XII.—EXPANDING KEY FOR A LOCK.

*The SILVER VULCAN MEDAL was this Session given to Mr. GEORGE MACHIN, of Wolverhampton, for an EXPANDING KEY FOR A LOCK, a Model of which has been placed in the Society's Repository.*

IN this key the bit or lever which raises the tumblers, and shoots the bolt, is moveable on a countersunk pin, so that it may slide thereon, and thus be drawn one eighth of an inch from the barrel.

The hole in the escutcheon-plate is of such a length as to admit the key only when the bit is pressed close up to the barrel. When the key in this state is introduced, and is begun to be turned round, one of the notches in the bit takes into a raised circular edge of steel, placed eccentric with regard to the lock-pin; so that as the key is turned, the bit is drawn out, and is at its greatest elongation when it arrives at the tumblers, and other moveable parts of the lock; hence it is obvious that no common or skeleton key that could pass the escutcheon-plate would have a bit long enough to reach the tumblers, and shoot the bolt.

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*Reference to the Engraving.—Plate VII.*

The wards *a a*, figs. 1 and 2, and *b b*, fig. 10, are made eccentric, the shortest distance being under the key-hole, and the longest towards the bolt; and the shortened key is provided with a sliding bit *c*, figs. 11, 12, 13, which is gradually brought out by the eccentric wards till it becomes long enough both to arrange the tumblers and move the bolt, and continuing to turn the

key round the sliding bit *c*, is returned or slid back till it is short enough to come out of the hole.

Fig. 1 represents the lock, having the front plates removed; *d d* the bolt, *e* and *f* parts of the tumblers under it; in fig. 2 the bolt is removed, to show these tumblers *e* and *f*; the tumbler *e* slides in the pieces *g g*, and the tumbler *f* slides in a recess *h h*, fig. 3, in the back of the tumbler *e*, and also in a recess *i*, made in the plate of the lock; this latter is shown in fig. 4, which is a section.

Fig. 3 shows the under side, fig. 5 the upper side, and fig. 6 an end view of the tumbler *e*.

Figs. 7 and 8, a side and top view of the tumbler *f*.

Fig. 9, an elevation of the tumblers in their places, the bolt *d d* being raised a little to show its locking pin or stud *j*.

Fig. 10, the inside of the plate which contains the upper ward *b b*; *k*, figs. 1, 2, and 4, the pin on which the key turns; *l*, fig. 2, the split or double springs which press down each tumbler. The eccentric ward *a a*, which slides out the key-bit *c*, by its gap *m*, is filed away at top to make room for the nib of the tumbler *f*, so that it cannot retain the key-bit *c* extended in that part, while the action of the springs *l* on the tumblers is urging it back; the bit *c* is therefore only kept extended in that part by the upper eccentric ward *b b*, which fits into the gap *n*; and as its action depends on that ward, a spring is put within the key which acts on the top of the pin *k*, and keeps the key in close contact with the upper ward. The key, fig. 11, is partly sectioned, and at different places, purposely to show the thin tube within the pipe which retains the spring and the loose metal plate *s* in their places; the sliding bit *c* is here close ready to enter the lock in figures 12 and 13; the bit *c* is shown extended long enough to move the bolt.

Fig. 13, being an end view, shows the thin tube within the pipe.

Fig. 14 shows the nib *o* of the key without the sliding-bit; it has a groove *p* for the end of a pin fixed in the sliding-piece *c*, to move in and keep it from coming off; *q q*, figs. 1 and 2, the ridge of the tumbler *e* against which the prominent end of the bit *c* acts; *r* the part of the key-bit which acts against the curved end *f* of the tumbler *f* to raise it.



### XIII.—TRUSSED GIRDER OF WROUGHT IRON.

*The SILVER VULCAN MEDAL was this Session presented to Mr. GEORGE SMART, of King's Arms Wharf, Lambeth, for his TRUSSED GIRDER OF WROUGHT IRON, a Model of which has been placed in the Society's Repository.*

King's Arms Wharf, Lambeth,

November 17, 1826.

DEAR SIR;

I HAVE sent for the inspection of the Society a model of a wrought-iron beam of my invention, applicable for bridges, girders, breastsummers, roofs, or other purposes where stiffness, strength, and lightness are required.

I am, Sir,

*A. Aikin, Esq.*

&c. &c. &c.

*Secretary, &c. &c.*

GEORGE SMART.



The girder is made by welding an arched bar of wrought iron to a longer straight bar, and then turning the ends of this latter either up or down as may be most convenient for the particular use to which the girder is to be